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EXAMINER	
LEUNG, CHRISTINA Y	
ART UNIT	**PAPER NUMBER**
2613	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/775,911	MORGAN, DENNIS R.	
	Examiner	Art Unit	
	Christina Y. Leung	2613	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 July 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5,7-11 and 13-22* is/are rejected.

7)☒ Claim(s) *6 and 12* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Introductory Comments

1. As noted in the Notice of Panel Decision from Pre-Appeal Brief Review mailed 30 August 2007, the finality of the last Office action is withdrawn and prosecution has been reopened.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. **Claims 16, 17, 21, and 22** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 16 recites "further comprising the step of measuring said polarization mode dispersion in a received optical signal." However, claim 13, on which claim 16 depends, recites an apparatus, not a method. Claim 16 is infinite because it is unclear whether the claims recites an apparatus or a method including method steps. **Claim 17** depends on claim 16 and is also indefinite for the same reason.

Similarly, **claim 21** recites "further comprising the step of measuring said polarization mode dispersion in a received optical signal." However, claim 18, on which claim 21 depends, recites an apparatus, not a method. Claim 21 is infinite because it is unclear whether the claims recites an apparatus or a method including method steps. **Claim 22** depends on claim 21 and is also indefinite for the same reason.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. **Claims 1-4 and 13-16** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Madsen et al.** ("Optical filter architecture for approximating any 2 x2 unitary matrix," Optics Letters, vol. 28, no. 17, April 1, 2003, pages 534-536) in view of **MacFarlane et al.** (US 6,687,461 B1).

Examiner notes that "Madsen et al." throughout in this Office action refers to the non-patent literature document "Optical filter architecture for approximating any 2 x2 unitary matrix" and is not the same as the document cited in previous Office actions as "Madsen" ("Optical all-pass filters for polarization mode dispersion compensation").

Regarding **claim 1**, Madsen et al. disclose a method for compensating for polarization mode dispersion in an optical fiber communication system (Figures 1-3), comprising the steps of:

reducing the polarization mode dispersion using a cascade of all-pass filters (see Abstract and Figure 3); and

adjusting coefficients of the all-pass filters (see page 535, left column, first complete paragraph).

Regarding **claim 13**, as similarly discussed above with regard to claim 1, Madsen et al. disclose a polarization mode dispersion compensator in an optical fiber communication system, comprising:

a cascade of all-pass filters having coefficients that are adjusted (again, see Abstract, Figure 3, and page 535, left column, first complete paragraph).

Regarding claims 1 and 13, Madsen et al. disclose adjusting the coefficients using a least squares algorithm (see page 535, left column, first complete paragraph) but do not specifically disclose adjusting the coefficients using a least mean square algorithm.

However, various optimization algorithms are well known in the signal processing and communication arts, and MacFarlane et al. in particular teach a system that is related to the one described by Madsen et al. including optical filters for compensating polarization mode dispersion having adjusted coefficients (column 1, lines 28-53; column 2, lines 51-65; column 5, lines 23-42). MacFarlane et al. further teach that the filter coefficients may be adjusted using a variety of minimization algorithms, including a least squares algorithm or a least mean square algorithm (column 19, lines 16-22).

Regarding claims 1 and 13, it would have been obvious to a person of ordinary skill in the art to specifically use a least mean square algorithm as taught by MacFarlane et al. in the system disclosed by Madsen et al. as an engineering design choice of another way to provide the minimization function already disclosed by Madsen et al. (Madsen et al., page 535, left column, first complete paragraph) and thereby effectively adjust the filter coefficients to quickly and accurately compensate dispersion.

Regarding **claims 2 and 14**, Madsen et al. disclose that the cascade of all-pass filters comprises a two-channel structure consisting of multiple cascades of all-pass filters and directional couplers (Figure 3).

Regarding **claims 3 and 15**, Madsen et al. disclose that the coefficient values are adjusted to minimize a cost function (page 535, left column, first complete paragraph). Examiner notes that MacFarlane et al. also teach adjusting filter coefficients to minimize a cost function (column 19, lines 16-22).

Regarding **claims 4 and 16**, as well as claim 16 may be understood with respect to 35 U.S.C. 112 discussed above, Madsen et al. disclose measuring the polarization mode dispersion in a received optical signal (using the "estimate channel" element shown in Figure 1; see also page 534, left column, second complete paragraph).

6. **Claims 5 and 17** rejected under 35 U.S.C. 103(a) as being unpatentable over **Madsen et al.** in view of **MacFarlane et al**. as applied to claims 4 and 16 respectively above, and further in view of **Applicant's Admitted Prior Art**.

Regarding **claims 5 and 17**, as well as claim 17 may be understood with respect to 35 U.S.C. 112 discussed above, Madsen et al. in view of MacFarlane et al. describe a system and a method as discussed above with regard to claims 4 and 16 respectively, including a step of measuring the polarization mode dispersion in a received optical signal. They do not specifically suggest that the measuring step employs a tunable narrowband optical filter to render information from energy detector measurements.

However, Applicant's Admitted Prior Art (Applicant's Figures 1-3) suggests a system that is related to the one described by Madsen et al. in view of MacFarlane et al., including a polarization mode dispersion compensator 110 and a channel estimate element 300 for measuring polarization mode dispersion in a received optical signal (Applicant's specification, page 3, lines 3-25). Applicant's Admitted Prior Art further suggests that the measuring step

employs a tunable narrowband optical filter 304 to render information from energy detector measurements (see Applicant's Figure 3 and specification, page 3, lines 26-32 and page 4, lines 1-4).

Regarding claims 5 and 17, it would have been obvious to a person of ordinary skill in the art to include a tunable narrowband optical filter as taught by Applicant's Admitted Prior Art in the system described by Madsen et al. in view of MacFarlane et al. in order to effectively provide the polarization mode dispersion measurement already disclosed by Madsen et al. and thereby enable the filters to compensate for the dispersion accurately.

7. **Claims 7-10 and 18-21** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Madsen et al.** ("Optical filter architecture for approximating any 2 x2 unitary matrix," Optics Letters, vol. 28, no. 17, April 1, 2003, pages 534-536) in view of **Eyal. et al.** ("Design of Broad-Band PMD Compensation Filters," IEEE Photonics Technology Letters, vol. 14, no. 8, August 2002, pages 1088-1090).

Again, Examiner notes that "Madsen et al." throughout in this Office action refers to the non-patent literature document "Optical filter architecture for approximating any 2 x2 unitary matrix" and is not the same as the document cited in previous Office actions as "Madsen" ("Optical all-pass filters for polarization mode dispersion compensation").

Regarding **claim 7**, Madsen et al. disclose a method for compensating for polarization mode dispersion in an optical fiber communication system (Figures 1-3), comprising the steps of:

reducing the polarization mode dispersion using a cascade of all-pass filters (see Abstract and Figure 3); and

adjusting coefficients of the all-pass filters (see page 535, left column, first complete paragraph).

Regarding **claim 18**, as similarly discussed above with regard to claim 7, Madsen et al. disclose a polarization mode dispersion compensator in an optical fiber communication system, comprising:

a cascade of all-pass filters having coefficients that are adjusted (again, see Abstract, Figure 3, and page 535, left column, first complete paragraph).

Regarding claims 1 and 13, Madsen et al. disclose adjusting the coefficients using a least squares algorithm (see page 535, left column, first complete paragraph) but do not specifically disclose adjusting the coefficients using a **Newton** algorithm.

However, various optimization algorithms are well known in the signal processing and communication arts, and

Eyal. et al. in particular teach a system that is related to the one described by Madsen et al. including optical filters for compensating polarization mode dispersion having adjusted coefficients (page 1088). Eyal et al. further teach that the filter coefficients may be adjusted using a Newton algorithm (page 1089, see particularly the end of the first paragraph of the right column).

Regarding claims 7 and 18, it would have been obvious to a person of ordinary skill in the art to specifically use a Newton algorithm as taught by Eyal et al. in the system disclosed by Madsen et al. as an engineering design choice of another way to provide the minimization function already disclosed by Madsen et al. (Madsen et al., page 535, left column, first complete

paragraph) and thereby effectively adjust the filter coefficients to quickly and accurately compensate dispersion.

Regarding **claims 8 and 19**, Madsen et al. disclose that the cascade of all-pass filters comprises a two-channel structure consisting of multiple cascades of all-pass filters and directional couplers (Figure 3).

Regarding **claims 9 and 20**, Madsen et al. disclose that the coefficient values are adjusted to minimize a cost function (page 535, left column, first complete paragraph). Examiner notes that Eyal et al. also teach adjusting filter coefficients to minimize a cost function (page 1089).

Regarding **claims 10 and 21**, as well as claim 21 may be understood with respect to 35 U.S.C. 112 discussed above, Madsen et al. disclose measuring the polarization mode dispersion in a received optical signal (using the "estimate channel" element shown in Figure 1; see also page 534, left column, second complete paragraph).

8. **Claims 11 and 22** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Madsen et al.** in view of **Eyal et al.** as applied to claims 7 and 18 respectively above, and further in view of **Applicant's Admitted Prior Art**.

Regarding **claims 11 and 22**, as well as claim 22 may be understood with respect to 35 U.S.C. 112 discussed above, Madsen et al. in view of Eyal et al. describe a system and a method as discussed above with regard to claims 7 and 18 respectively, including a step of measuring the polarization mode dispersion in a received optical signal. They do not specifically suggest that the measuring step employs a tunable narrowband optical filter to render information from energy detector measurements.

However, Applicant's Admitted Prior Art (Applicant's Figures 1-3) suggests a system that is related to the one described by Madsen et al. in view of Eyal et al., including a polarization mode dispersion compensator 110 and a channel estimate element 300 for measuring polarization mode dispersion in a received optical signal (Applicant's specification, page 3, lines 3-25). Applicant's Admitted Prior Art further suggests that the measuring step employs a tunable narrowband optical filter 304 to render information from energy detector measurements (see Applicant's Figure 3 and specification, page 3, lines 26-32 and page 4, lines 1-4).

Regarding claims 5 and 17, it would have been obvious to a person of ordinary skill in the art to include a tunable narrowband optical filter as taught by Applicant's Admitted Prior Art in the system described by Madsen et al. in view of Eyal et al. in order to effectively provide the polarization mode dispersion measurement already disclosed by Madsen et al. and thereby enable the filters to compensate for the dispersion accurately.

Allowable Subject Matter

9. **Claims 6 and 12** are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

10. The following is a statement of reasons for the indication of allowable subject matter:

The prior art, including Madsen et al., MacFarlane et al., Eyal et al., and Applicant's Admitted Prior Art, does not specifically disclose or fairly suggest a method including all of the limitations and steps recited in claims 6 or 12 (and including all of the limitations of their respective parent claims).

Response to Arguments

11. Applicant's arguments filed 18 July 2007 with respect to claims 1-5, 7-11, and 13-22 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christina Y. Leung whose telephone number is 571-272-3023. The examiner can normally be reached on Monday to Friday, 8:30 to 5:00. *Please note that correspondence concerning this application should now be directed to Examiner Christina Leung and not to the previous examiner (David Lee).*

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan, can be reached on 571-272-3022. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 571-272-2600.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

CHRISTINA LEUNG
PRIMARY EXAMINER